

POGIL in the Biochemistry classroom

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Texas State University San Marcos

Primarily
undergraduate

~27k students

97% from Texas

20:1 student:teacher

1072 average SAT



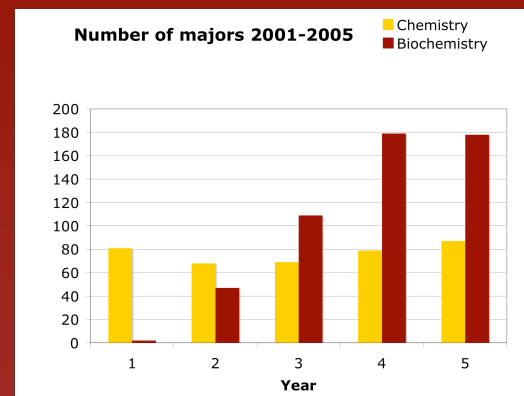
Demographics at Texas State

	% Women	% Hispanic	% African American	% Native American
Texas	50	32	12	< 1
TxState	56	18	5	< 1
College of Science	39	21	5	< 1
Dept of Chem & Biochem	46	27	7	< 1

References: US census bureau, 2000 Census of population; TxState Office of Institutional Research, Oct 2005



Biochemistry major



Principles of Biochemistry

- First offered in 2003
- Only junior biochemistry minors and majors
- Prerequisite for ALL other Biochem courses
- 15-60 students per Fall semester
- POGIL used in Fall 2004
- Self-selected groups of 3-4



Principles POGIL exercises

- *Hydrogen bonding*
- *Bond properties*
- *Acid-base reaction*
- *Nucleophilicity*
- *Polarity*
- *Beer's Law*
- *Hypochromism*
- *Amino Acids*
- *Amino acid interactions*
- *pI*
- *Protein purification*
- *Protein characterization*
- *DNA sequencing*
- *Restriction mapping*
- *Enzyme kinetics*
- *Enzyme mechanism*
- *Enzyme regulation*
- *Carbohydrates*



Student performance

Semester	DFW rate
FALL02	10%
FALL03	40%
FALL04	25%
FALL05	64%



Metabolism

- Offered since before 1997
- Mixed classes
 - Junior biochem/chem minors
 - Senior biochem majors
 - Masters levels students
- 40-60 students per semester
- POGIL started in Spring 2005
- Mixed groups of 3-4



Metabolism exercises

POGIL exercises

- *Thermodynamics*
- *Glycolysis*
- *Gluconeogenesis*
- *Oxidative phosphorylation*
- *Fatty acid metabolism*

Other group exercises

- *Signal transduction*
- *Gluconeogenesis*
- *Citric acid cycle*
- *Photosynthesis*
- *Glycogen metabolism*
- *Amino acid metabolism*



Student performance

Semester	DFW rate
SP99	44%
SP00	38%
SP01	33%
SP02	32%
SP03	26%
SP04	30%
SP05	16%
SP06	15%



Student attitudes

- Very strong resistance in first year
 - Complaints to chair
 - Begging to go back to lecture
- Now it is expected, less resistance
- No change in student evaluation scores
- Lessons
 - Spend as much time as possible on buy-in
 - Make sure that you have administrative support



Faculty attitudes

- Happy for me to be the guinea pig
- More than half have moved from all lecture
- Five have attended POGIL workshops
- One is authoring POGIL exercises
- Two are using POGIL in Gen Chem SI sessions
- Three submitted a CCLI proposal for using POGIL in all Gen Chem and Org SI sessions
- All have some concerns, but see the need for change



Student performance in subsequent classes

- Students that did well in group exercises did not do as well in subsequent all lecture classes
- All students graduated within 1 semester of expected graduation time
- Lessons
 - Need to emphasize writing skills more
 - Need to emphasize test taking skills more



Performance on ACS exam

Year	Average score
2004 no POGIL	30±6 (n=9)
2005 1 semester POGIL	35±9 (n=18)
2006 2 semesters POGIL	27±2 (n=21)



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